Overview of Green River Reclaimed Water Study

E&P Subcommittee Meeting

October 24, 2007

Purpose of Study

To answer basic questions raised by the Cities of Auburn, Covington, Kent, Renton, and Tukwila

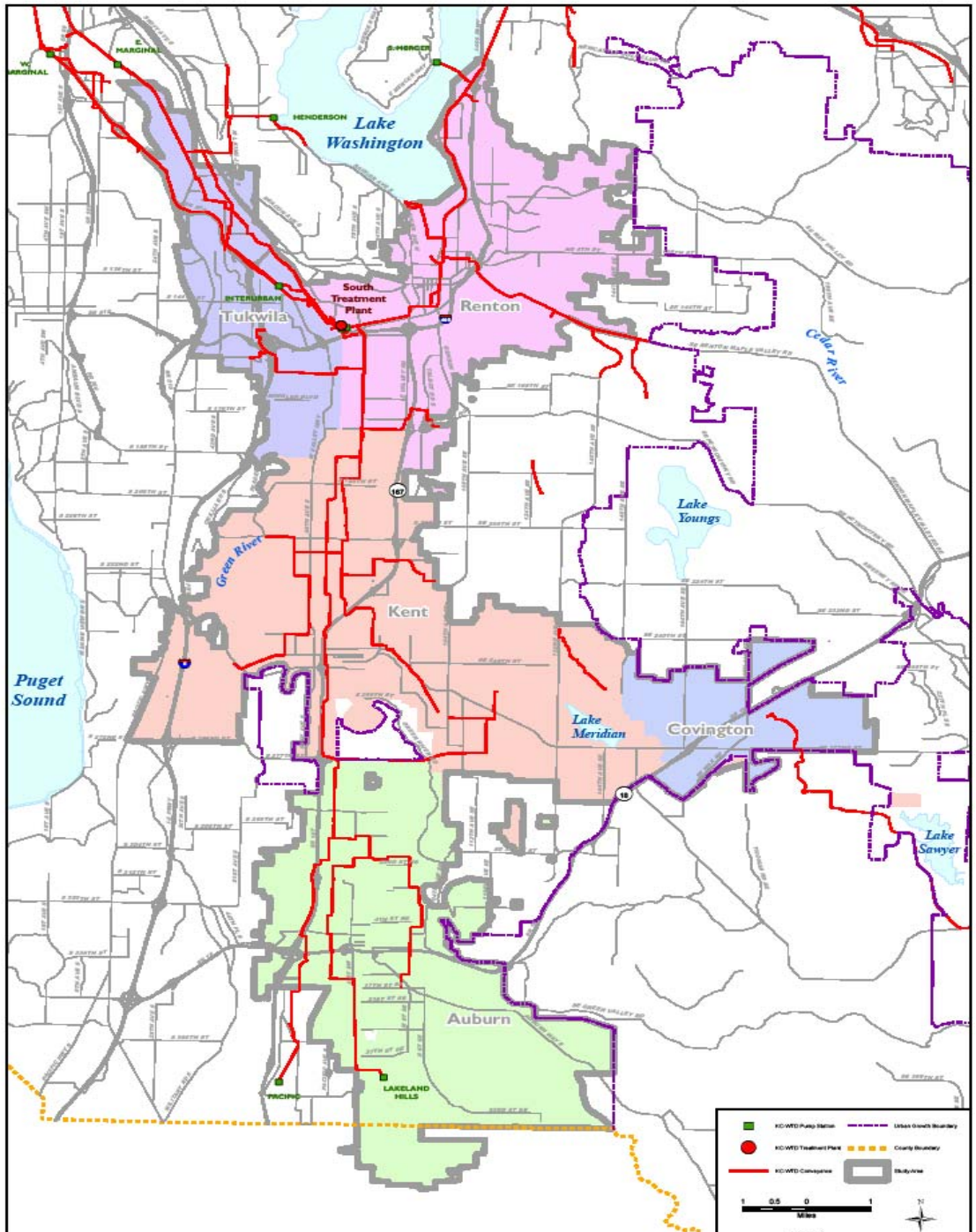
Key Questions

- What treatment processes and equipment are necessary to produce and deliver Class A reclaimed water to the Green River Valley:
- How much reclaimed water might be made available through each production/delivery scenario?
- What can be estimated about the relative capital and operating costs for each production/delivery scenario?
- What appears to be the most feasible approach to producing and delivering reclaimed water in the Green River Valley based on preliminary estimated costs, capacities, demands, and operational issues?

Use Assumptions

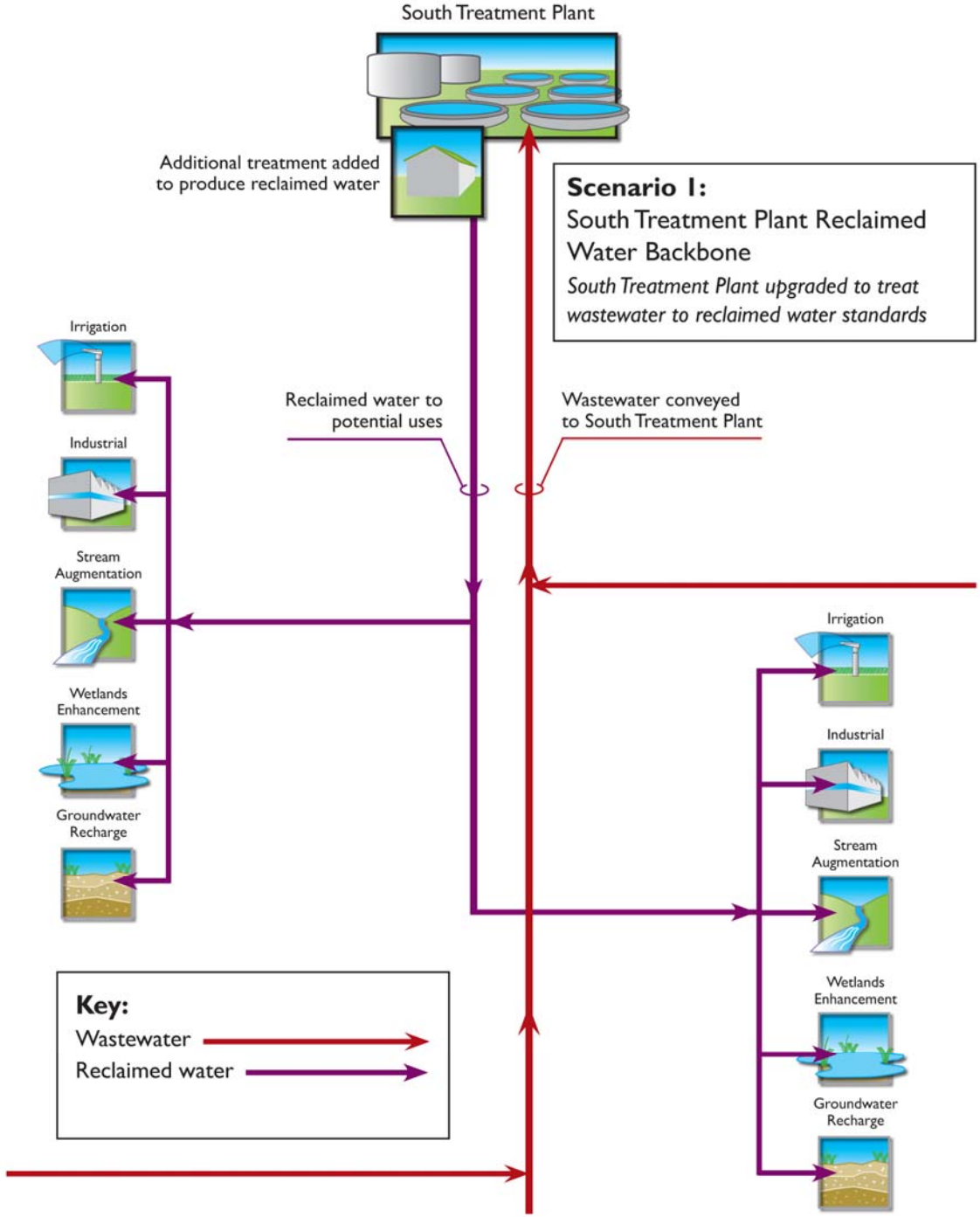
- Year 2016: 15 mgd total potential reclaimed water use
- Year 2020: 35 mgd total potential reclaimed water use
- Year 2030: 50 mgd total potential reclaimed water use

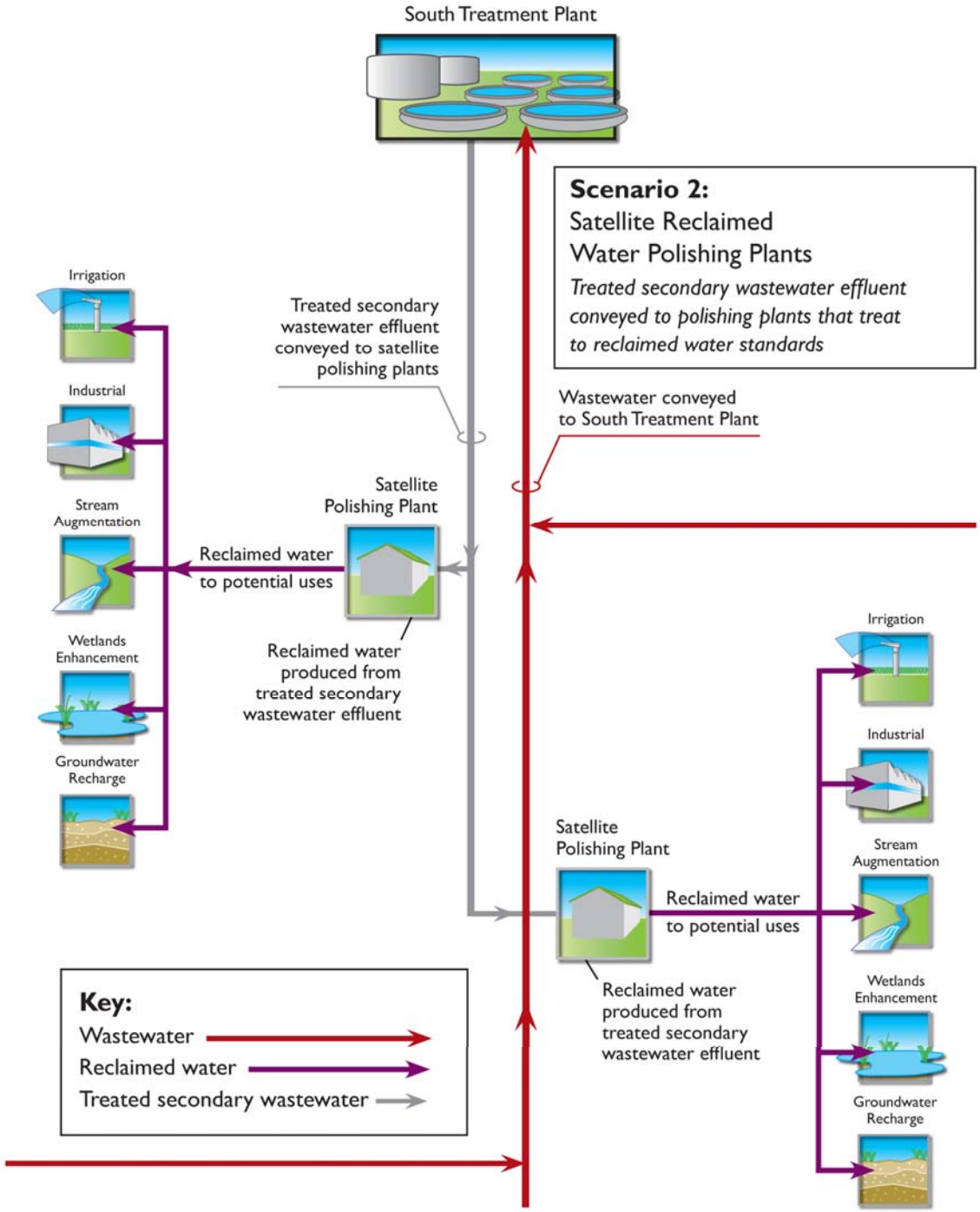
Green River Valley Reclaimed Water Study Area

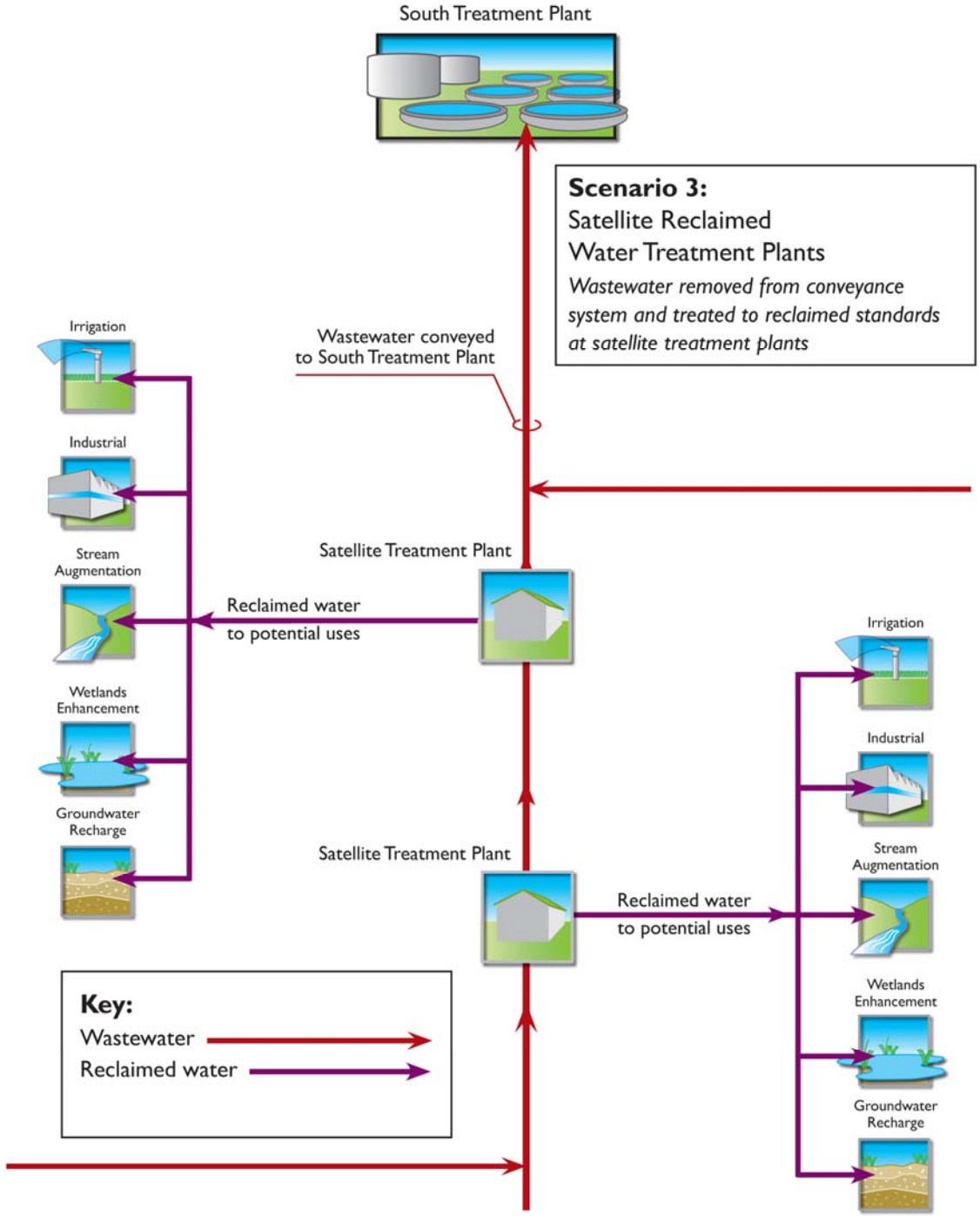


Three Reclaimed Water System Scenarios Considered

- South Plant Reclaimed Water Backbone
- Satellite Reclaimed Water Polishing Plants
- Satellite Reclaimed Water Treatment Plants


South Treatment Plant
Additional treatment added to produce reclaimed water
Scenario 1:
South Treatment Plant Reclaimed Water Backbone
South Treatment Plant upgraded to treat wastewater to reclaimed water standards
Irrigation
Industrial
Stream Augmentation
Wetlands Enhancement
Groundwater Recharge
Reclaimed water to potential uses
Wastewater conveyed to South Treatment Plant
Irrigation
Industrial
Stream Augmentation
Wetlands Enhancement
Groundwater Recharge
Key:
Wastewater
Reclaimed water


South Treatment Plant
Scenario 2:
Satellite Reclaimed
Water Polishing Plants
Treated secondary wastewater effluent conveyed to polishing plants that treat to reclaimed water standards
Irrigation
Industrial
Stream Augmentation
Wetlands Enhancement
Groundwater Recharge
Treated secondary wastewater effluent conveyed to satellite polishing plants
Wastewater conveyed to South Treatment Plant
Satellite Polishing Plant
Reclaimed water to potential uses
Reclaimed water produced from treated secondary wastewater effluent
Irrigation
Industrial
Satellite Polishing Plant
Stream Augmentation
Reclaimed water to potential uses
Wetlands Enhancement
Reclaimed water produced from treated secondary wastewater effluent
Groundwater Recharge
Key:
Wastewater
Reclaimed water
Treated secondary wastewater


South Treatment Plant
Scenario 3:
Satellite Reclaimed
Water Treatment Plants
Wastewater removed from conveyance system and treated to reclaimed standards at satellite treatment plants
Irrigation
Wastewater conveyed to South Treatment Plant
Industrial
Satellite Treatment Plant
Stream Augmentation
Reclaimed water to potential uses
Irrigation
Wetlands Enhancement
Industrial
Groundwater Recharge
Satellite Treatment Plant
Stream Augmentation
Reclaimed water to potential uses
Wetlands Enhancement
Groundwater Recharge
Key:
Wastewater
Reclaimed water

Operational Findings

- Local Average Dry Weather Flows Available for Reclaimed Water Production

Area	Estimated Locally Available Reclaimed Water Supply (mgd)[1]		
	2006	2016	2030
Auburn Area	10	13	17
Kent Area	12	13	15
Renton/Tukwila Area	42	60	72
Total	65	86	104
Notes:			
1. Estimated from King County flow metering location data and forecasts			

- Scenarios 1 or 2 offer the most flexibility and least limitations for providing reclaimed water volumes throughout the study area

Cost Findings

Scenario	Year	Total System Capacity (mgd)	Estimated Capital Costs					Estimated Annual O&M Costs	Estimated Present Value Cost	Estimated Annual Debt Service Cost	Estimated Annual Cost	Annual Irrigation Volume Estimate (mg)	Annual Unit Cost ($/mg)
			Treatment	Treatment Siting	Regional Distribution	Local Distribution	Total						
1 - South Treatment Plant Secondary Wastewater Effluent Polishing with Reclaimed Water Backbone Distribution													
	2016	15	$85		$27	$106	$218	$2.2	$252	$15	$17	744	$0.022
	2020	35	$160		$27	$248	$436	$4.4	$501	$29	$33	1,737	$0.019
	2030	50	$217		$27	$354	$599	$6.0	$689	$40	$46	2,481	$0.018
2 - Satellite Polishing Plants with South Plant Secondary Effluent Backbone and Local Reclaimed Water Distribution													
	2016	15	$148	$35	$27	$106	$317	$3.5	$369	$21	$25	744	$0.033
	2020	35	$295	$35	$27	$248	$606	$7.2	$715	$40	$48	1,737	$0.027
	2030	50	$406	$35	$27	$354	$823	$10.0	$974	$55	$65	2,481	$0.026
3 - Satellite Treatment Plants with Local Reclaimed Water Distribution													
	2016	15	$236	$35		$106	$378	$8.2	$501	$25	$33	744	$0.045
	2020	35	$452	$35		$248	$735	$15.6	$970	$49	$64	1,737	$0.037
	2030	50	$614	$35		$354	$1,003	$21.1	$1,321	$67	$88	2,481	$0.035

- Cost estimates are lowest for Scenario 1 due to economies of scale
- Unit costs decline dramatically as the volume of reclaimed water consumed grows